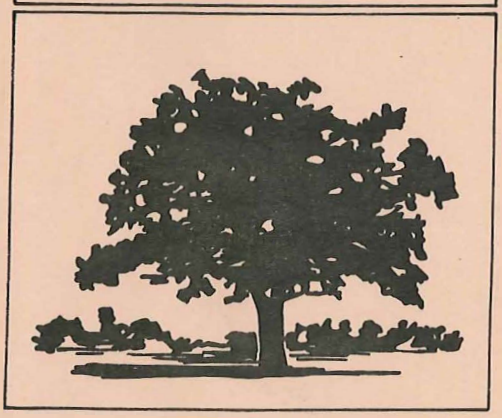

FOREST PEST CONDITIONS IN WISCONSIN

ANNUAL REPORT 1983

DEPARTMENT OF NATURAL RESOURCES
BOX 7921
MADISON, WISCONSIN 53707

FOREST PEST CONDITIONS IN WISCONSIN ANNUAL REPORT - 1983

Compiled and Edited by Allen J. Prey, David J. Hall, and Jane E. Cummings

DEPARTMENT OF NATURAL RESOURCES
Division of Resource Management
Bureau of Forestry

PREFACE

This record of the activities of forest pests and other destructive agents of growing trees in Wisconsin's forest nurseries, plantations, and natural timber areas was made possible by the dedicated work of pest management personnel in each district and at the Forest Pest Management Laboratory at Nevin Hatchery in Madison. DNR foresters, other Department field personnel, cooperators in other public agencies and private forest industry contributed valuable assistance in monitoring the forest lands in all classes of forest ownership.

The directory and map on page ii designates the location of the DNR Forest Management Staff as of July 31, 1984.

Allen J. Prey, Supervisor
Forest Pest Management
July 31, 1984

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Department of Natural Resources
Forest Pest Management Personnel July 31, 1984

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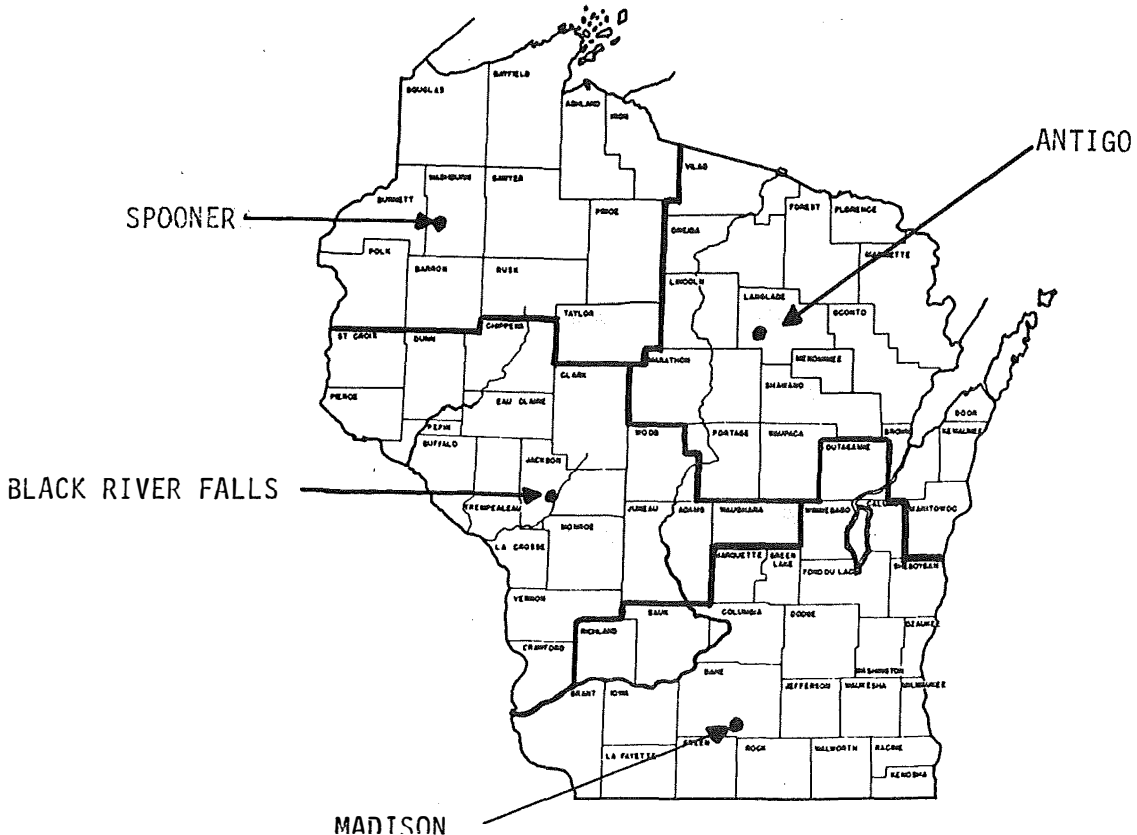


ASPEN

Aspen Bronzing - Unknown

Decline symptoms of large-toothed aspen and quaking aspen were first observed in 1973. Symptoms of this disease on large-toothed aspen include bronzing of leaves in the lower crown during July and August, followed by necrosis in September and death of branches with bronzed leaves in subsequent years. Symptoms on quaking aspen include chlorotic and necrotic leaf spots scattered throughout the crown in June and July with bronzing developing in late July and August. No new locations of this disease were reported in 1983.

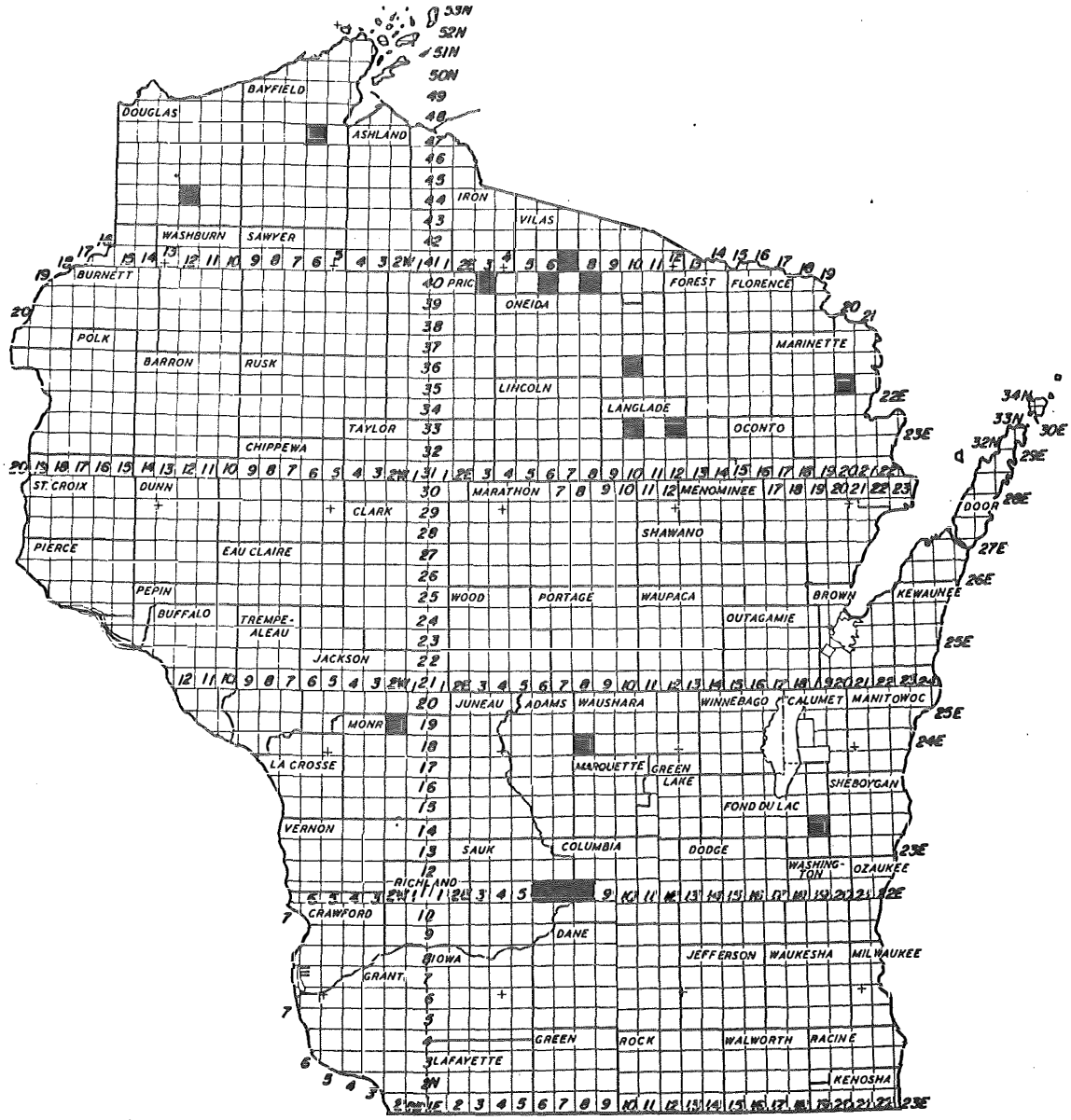


Figure 1. Township locations of Aspen bronzing reported since 1973.

Leaf Rust - Melampsora medusae Thum. This disease caused early leaf drop in Northern Sawyer and Southern Bayfield Counties.

Aspen Blotchminer - Phyllonorycter tremuloidiella (Braun)

Populations remained high in the northeastern counties. Heavy defoliation occurred in large areas of Vilas, Forest, Oneida and Langlade Counties. In the northwest, heavy defoliation occurred in Burnett and Douglas Counties.

Forest Tent Caterpillar - Malacosoma disstria (Hubner)

The infestation in Northwestern Wisconsin continued to decline so that approximately 290,000 acres of aspen and oak were defoliated in Bayfield, Ashland and Iron Counties. About 72,000 acres were in the heavy defoliation class; the remainder was light to moderately defoliated (Figure 2). Other scattered pockets of defoliation were observed in Sawyer, Price, Iron and Ashland Counties.

About 28,000 acres of poor quality aspen on low lying red clay soil in northwestern Douglas County are dead or in an advanced state of decline after four consecutive years of complete defoliation (Figure 2). This area was lightly defoliated this year.

The infestation is expected to continue to decline in 1984 and move further to the east.

Aspen Shoot Blight - Ventura tremulae Aderh.

Moderate to heavy infections occurred on trembling and large tooth aspen reproduction in Douglas County.

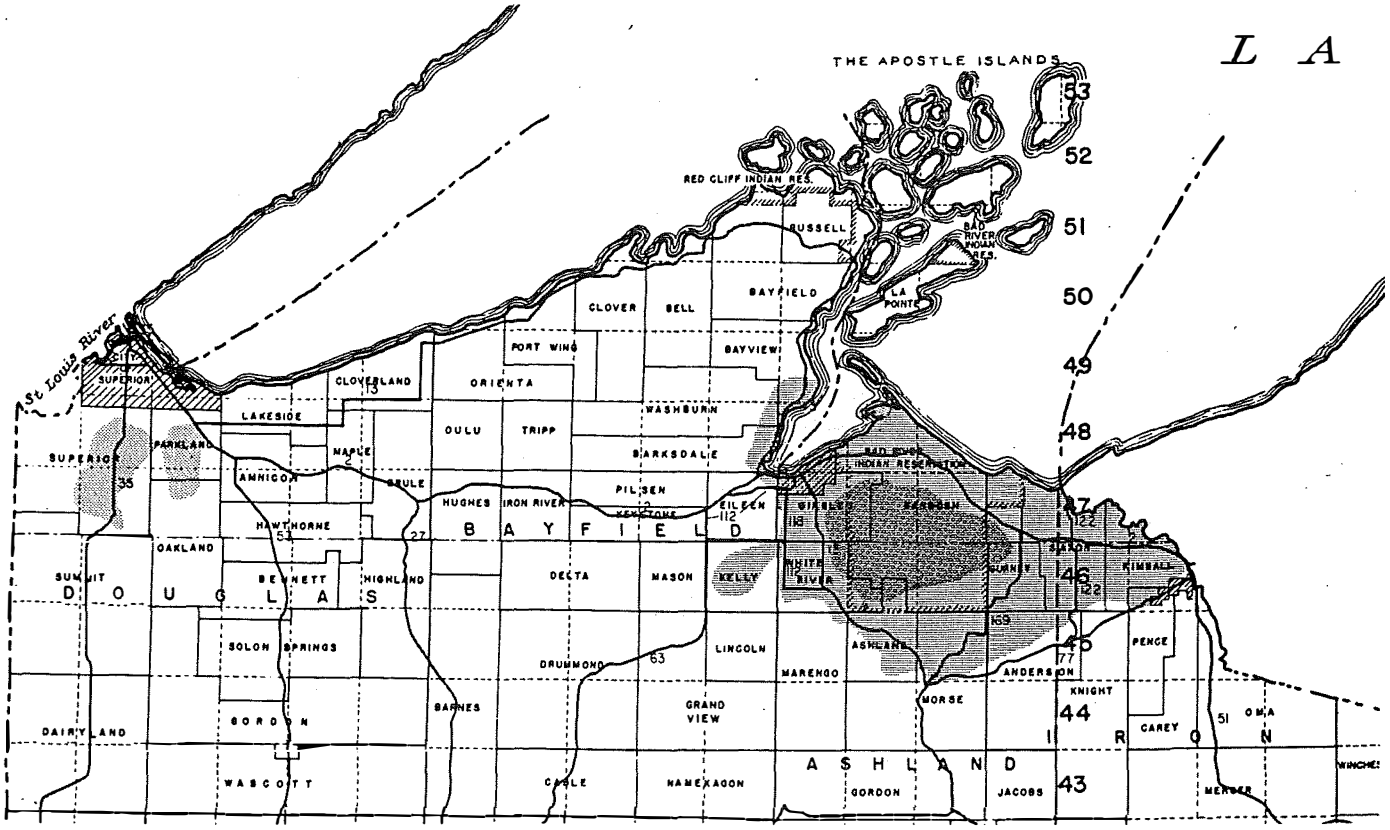


Figure 2. Area of light to moderate (light grey) and heavy (dark grey) defoliation of aspen and oak by the Forest Tent Caterpillar.

BALSAM FIR - SPRUCE

Spruce Budworm - Choristoneura fumiferana (Clemens)

Populations increased from the very low 1982 levels causing scattered pockets of defoliation in several northern counties. A 1200 acre pocket of balsam fir was completely defoliated in Western Langlade County; several smaller pockets of defoliation were reported in Oneida County. Several pockets of severe defoliation were reported in Ashland County, and pockets of light to moderate defoliation were present in Sawyer County.

Phenological Notes:

June 22 - Larvae in 4th and 5th instar on balsam fir in Oneida and Vilas Counties.

Balsam Gall Midge - Paradiplosis tumifex (Gagne)

Populations remained high causing considerable damage to Christmas trees in the northern counties. Heavy populations on natural stands were also observed. Control efforts with Diazinon in Price County were less than satisfactory. Test plots were established in Langlade County to test pydrin as a control of Balsam Gall Midge. Control was unsatisfactory.

Phenological Notes:

May 24 - First adults caught in traps.
May 25 - Oviposition taking place in north central counties.
June 1 - Adults ovipositing in Price County.

Balsam Twig Aphid - Mindarus abietinus (Koch)

Heavy infestations occurred in balsam fir Christmas trees in Langlade, Marathon and Jackson Counties. A light infestation in Washburn County was controlled naturally by lady beetle larvae.

BASSWOOD

Basswood Thrips - Sericothrips tiliae (Hood)

Spring defoliation increased to about 100,000 acres statewide. Large pockets of defoliation occurred in Rusk, Sawyer, Taylor, Price, Langlade, Lincoln, Oneida, Forest, Door and Grant Counties.

Radial growth has been severely reduced in the Rusk County infestation where basswood has been defoliated several consecutive years.

The first known basswood mortality associated with this insect in Wisconsin occurred in large pole and sawlog stands in Door County.

BIRCH

Birch Leafminer - Fenusa pusilla (Lepeletier)

Leafmining generally declined in forest stands in northern Wisconsin. Heavy defoliation to white birch was observed in Waushara, Waupaca, and Shawano Counties.

Birch Skeletonizer - Bucculatrix canadensisella (Chambers)

Defoliation occurred at decreased levels in Price, Iron and Taylor Counties.

BUTTERNUT

Butternut canker - Siroccoccus sp.

Widespread dieing of butternut was first reported in Southwestern Wisconsin in 1967. Trees of all ages and sizes growing in mixed or relatively pure stands on dry infertile ridge top or moist fertile bottom lands are cankered. Butternut canker was collected in two additional counties in 1983, Langlade and Marathon (Figure 3). The disease has now been observed in 21 counties. Butternut canker continues to kill trees on previously infected sites.

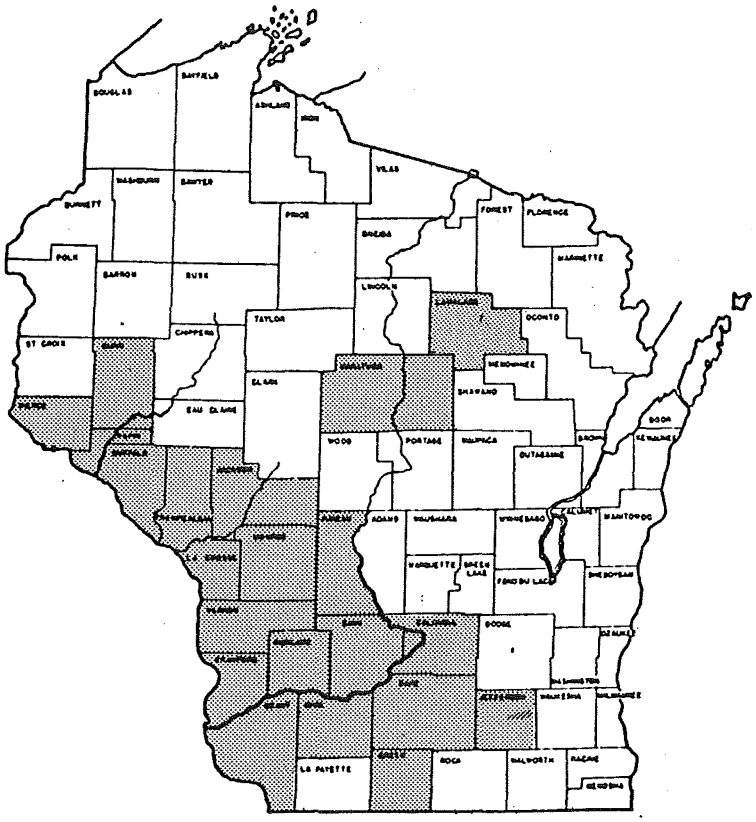


Figure 3. County distribution of Butternut Canker in Wisconsin, 1983.

CHERRY

Eastern Tent Caterpillar - Malacosoma americanum (Hubner)

The outbreak in the southern counties continued to decline. A few pockets of heavy defoliation were evident in Dane and Sauk Counties.

Phenological notes:

April 26 - First egg hatch in southern Dane County
May 25 - Larvae 1 inch long in Dane County

Cherry Scallop Shell Moth - Hydria prunivorata (Ferguson)

The infestation in Washburn County subsided to a low level. Some defoliation was observed in Adams, Columbia and Portage Counties.

DOUGLAS FIR

Rhabdocline Needlecast - (Rhabdocline pseudotsugae) Syd. This disease has been previously reported in two Douglas fir Christmas tree plantations. One in Door County and one in Bayfield County. No new locations were reported in 1983.

ELM

Dutch Elm Disease - Ceratocystis ulmi (Buisman) Moreau

Dutch elm disease was first reported in Wisconsin in 1956 and was found to be present statewide in 1975. Approximately 500 million cubic feet of elm died between 1968-78 from Dutch elm disease, but approximately 200 million cubic feet were utilized. In 1983, approximately 23% of the 1968 elm population in Wisconsin was alive. It appears that elm will continue to die in the forest but will not entirely be eliminated.

HEMLOCK

Hemlock Defoliation

Severe foliage loss was observed on Hemlock on Chambers Island in Green Bay waters. Some hemlock looper larvae were collected, however, the defoliation appears to be caused by some other factor.

Hemlock Mortality

Aerial surveys showed little increase in mortality of hemlock on the Menominee Tribal Forest.

LARCH

Larch Needlecast - Mycosphaerella laricina (Hartig)

Mycosphaerella needle cast of European larch was first reported in North America in 1980. This disease has been previously reported in six counties in Wisconsin (Figure 4). No new locations were reported in 1983. In 1981 a research project was initiated in a cooperative agreement between the USFS North Central Forest Experiment Station, the Forestry Sciences Laboratory in Rhinelander, and the Wisconsin DNR. Results from this project show that infection on understory trees decreases with increasing distance from an infected stand, and tamarack, Japanese larch, and European larch are all susceptible to Mycospharella needlecast when grown under optimum conditions for infection. The susceptibility of tamarack growing under natural conditions remains to be determined. A study plan on this disease is being developed by the cooperators.

Infection in previously reported locations in Wisconsin continued in 1983. In a 10 acre Polk County plantation, (Sec. 33 T37N, R15W) disease was present on 75-80% of the trees. On September 8, symptoms of the disease ranged from discoloration of the needles to complete defoliation. This plantation is suffering severe growth loss with some mortality and topkill. Incidence has decreased slightly from near 100% prevalence in 1981 and 82. Infection is expected to continue at high levels.

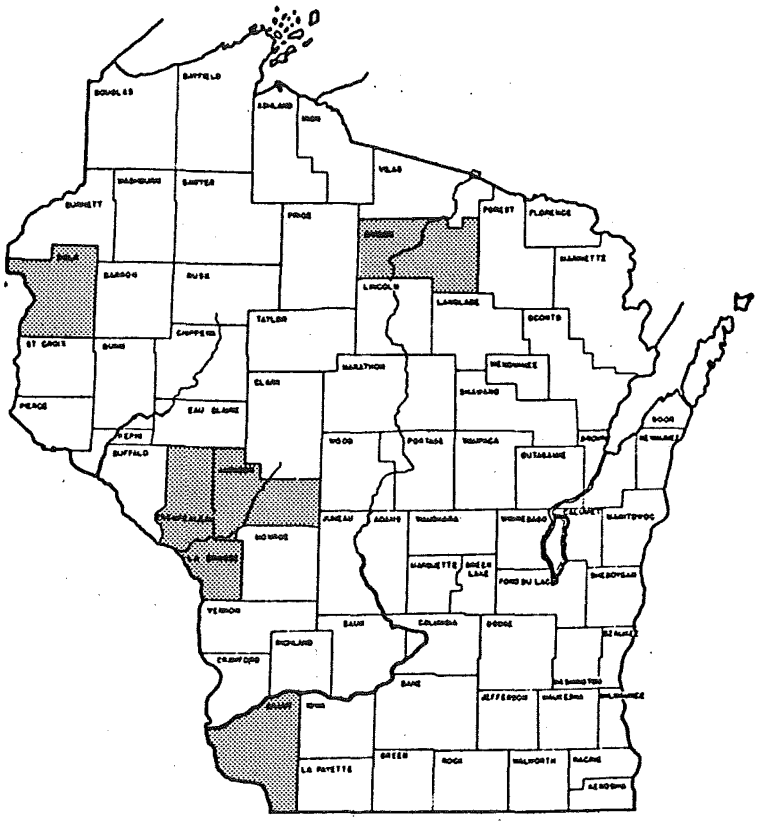


Figure 4. County distribution of Larch Needlecast in Wisconsin, 1983.

MAPLE

Maple Trumpet Skeletonizer - Epinotia aceriella (Clemens)

Populations declined in most northern areas. A few pockets of heavy defoliation occurred within widespread light defoliation in Vilas, Oneida, Forest and Langlade Counties.

Maple Webworm - Tetralopha asperatella (Clemens)

Pockets of heavy defoliation occurred in Langlade County, and Oneida County just north of Monico.

Greenstriped Mapleworm - Dryocampa rubicunda (Fab.)

Moderate defoliation was observed in Douglas and Washburn Counties. The total area was less than 1000 acres.

Wooley Alder Aphid - Paraprociphilus tesselatus (Fitch)

Low populations were present on silver maple and alder in Washburn County.

OAK

Actinopelte Leaf Spot - Actinopelte dryina (Sacc.) (Hoehn)

Foliage browning and leaf spotting was widespread on northern pin oaks and black oaks in central and Southwestern Wisconsin in August.

Oak Wilt - Cerctocystis fagacearum (Bretz) Hunt

Marathon county was the only new county where oak wilt was detected in 1983. Two locations were confirmed (Sec. 21, T26N, R7E, SWSE, and Sec. 21, T26N, R6E, SWNE). The disease is now present in 49 counties (Figure 5). Surveys of the oak wilt boundary counties will continue in 1984. Marinette County will also be closely watched for possible oak wilt because of a pocket present in Michigan near the Wisconsin - Michigan border.

Eastern Gall Rust - Cronartium quercuum f. sp. banksianae

Infection in mixed stands of jack pine and northern pin oak or bur oak occurred throughout Iowa, Sauk, Adams, Jackson, Douglas, and Bayfield Counties.

Oak Webworm - Archips fervidanus (Clemens)

This defoliator remained at low levels in the northwestern counties. It was common on scrub oaks in Southern Douglas County.

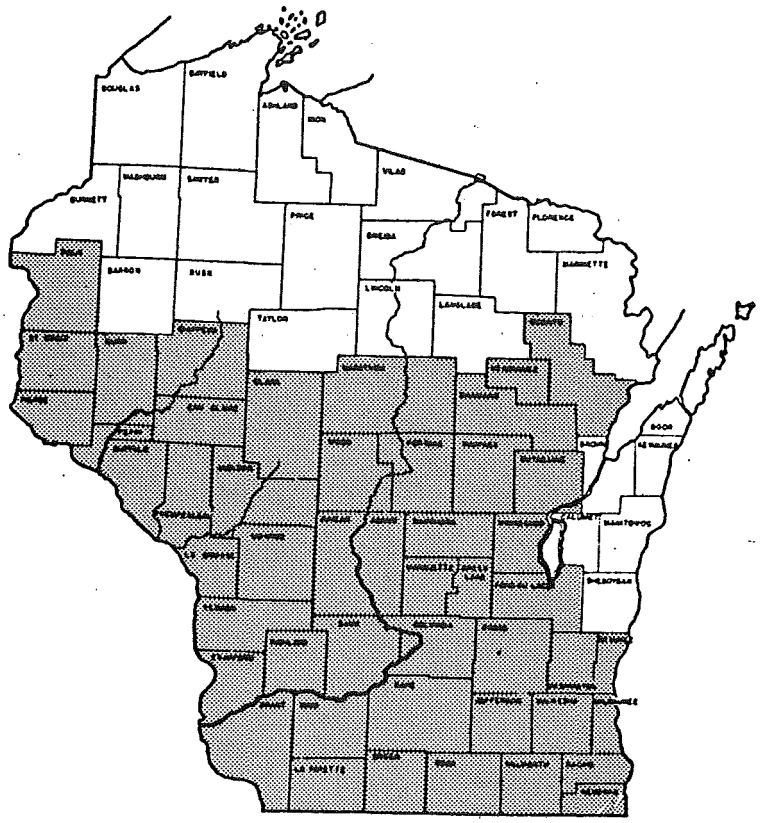


Figure 5. County distribution of Oak Wilt in Wisconsin, 1983.

Oak Skeletonizer - Bucculatrix ainsliella Murtfeldt

Light amounts of skeletonizing of black oak and cocoons were observed in many southern counties. Pockets of noticeable browning of leaves were reported in Waukesha, Adams and Columbia Counties.

Spring Defoliator Complex

Heavy defoliation by a tortricid larvae occurred on scub oak in Polk, Burnett, Washburn and Douglas Counties. Some trees failed to reflush and showed moderate dieback.

Walkingstick - Diapheromera femorata (Say)

Populations were sparse; only a pocket of hazelbrush was defoliated in Jackson County.

Oak Grasshopper - Dendrotettix quercus Packard

Moderate numbers of adults were observed feeding on oak foliage in Jackson County.

Orangestriped Oakworm - Anisota senatoria (J.E. Smith)

The first significant defoliation in many years occurred in the south central counties. Individual black oaks and pockets of bur oak were stripped in Waushara, Marquette, Columbia, Dane and Iowa Counties.

PINE

Root Rot - Armillaria mellea Vahl. ex Fr.

Root rot caused by Armillaria mellea was observed in scattered locations in five-ten year old red pine plantations in Central Wisconsin. All of the plantations had oak stumps present.

Scattered mortality of jack pine was observed in a 45 year old plantation in the Lincoln Co. forest (Sec. 24, T35N, R4E). Signs of Armillaria mellea such as honey mushrooms and rhizomorphs were observed.

Pine Wood Nematode - Bursaphelenchus xylophilus (Steiner and Buhrer)

The presence of the pine wood nematode has been confirmed in 21 widely scattered counties since 1981 (Figure 6). No reports of new county locations occurred in 1982 or 83.

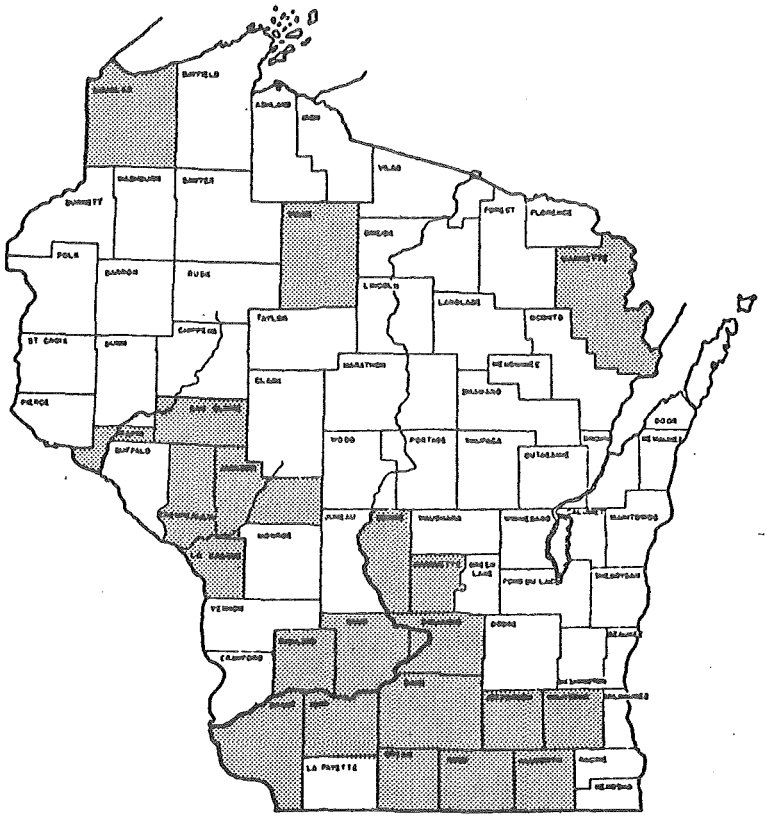


Figure 6. County distribution of the Pine Wood Nematode in Wisconsin, 1983.

Scleroderris Canker - Gremmeniella abietina (Lagerb.)

No new locations of Scleroderris canker were reported (Figure 7) but there was an increase in the number of infected trees in northern Bayfield County where growth impact was noted and some mortality was observed of three-four year old red pine. Surveys will be made biennially in Bayfield and Vilas Counties for new locations.

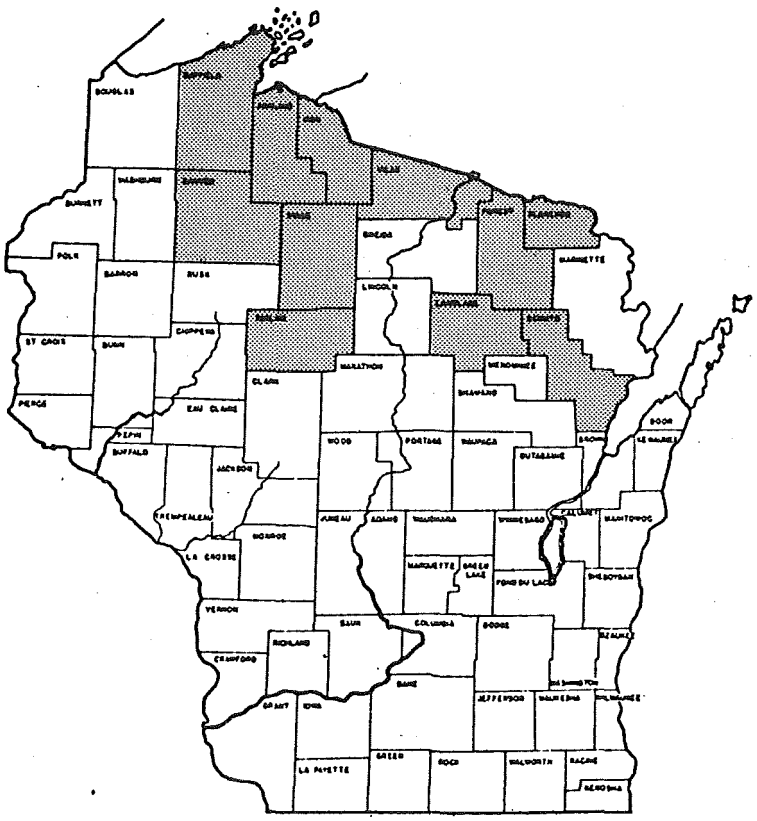
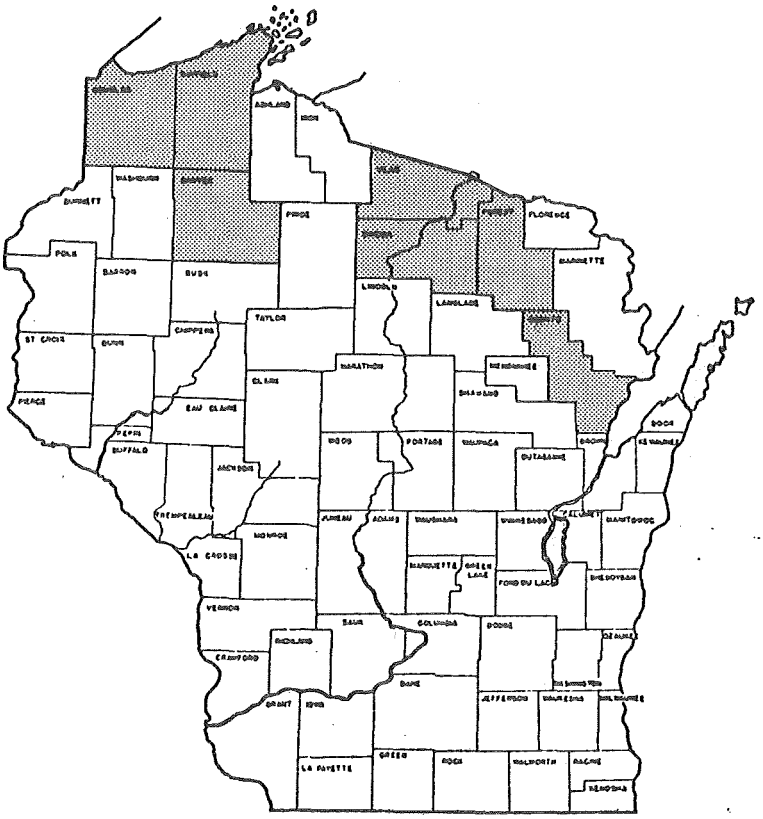


Figure 7. County distribution of Scleroderris Canker in Wisconsin, 1983.

Red Pine Shoot Blight - Sirococcus strobilinus (Pruess)

A new county record occurred in 1983 when red pine shoot blight was found at Amnicon Falls State Park, in Douglas County (Figure 8). Infection of red pine in Vilas County in the Northern Highland State Forest has increased in incidence, but severity is light, and infection is primarily limited to the lower branches. Infection increased in the Eagle River district of the Nicolet National Forest. Branch dieback was observed in understory and overstory trees and in open grown plantations. In Bayfield County on the Washburn district, (T49N, R6W, and R7W) infection was widespread and disease incidence has increased over levels of the past 5 years, but there appears to be no growth impact.



Red Pine Mortality

Two pockets of red pine mortality in Sauk County continued to expand in 1983. Another pocket near Wisconsin Dells was reported. A pocket that was initiated by lighting and bark beetles several years ago began expanding this year. In all of these pockets in pole-sized red pine stands, Ips grandicollis successfully attacks and kills the tree. We are unable to explain why trees on the edge of these pockets should be susceptible to attack by bark beetles every year.

Jack Pine Budworm - Choristoneura pinus (Rohwer)

The intensity of the infesation in the northwest counties increased dramatically; the acreage increased slightly. About 9600 acres of heavy defoliation and 65,000 acres of light to moderate defoliation in Douglas and Bayfield Counties (Figure 9). Another 5000 acres of moderate defoliation occurred in Burnett County and 500 acres of light defoliation occurred in Jackson County.

A 90% increase in egg mass counts for 1983 coupled with very low egg parasitism indicates the potential for a significant increase in the severity of the infestation in Douglas and Bayfield Counties.

Phenological notes:

June 1 - Larvae are in 2nd instar and feeding on new shoots in Burnett County
June 7 - Cold weather has delayed development in Douglas County; larvae in 2nd instar
June 14 - Most of larvae in 2nd instar, a few in 3rd, in Bayfield County.
June 22 - Larvae in 4th instar in Douglas and Bayfield Counties; 4th and 5th in Jackson County.
June 29 - Budworm in 5th instar and pupal stages.
August 3 - Egg laying complete in Douglas County.

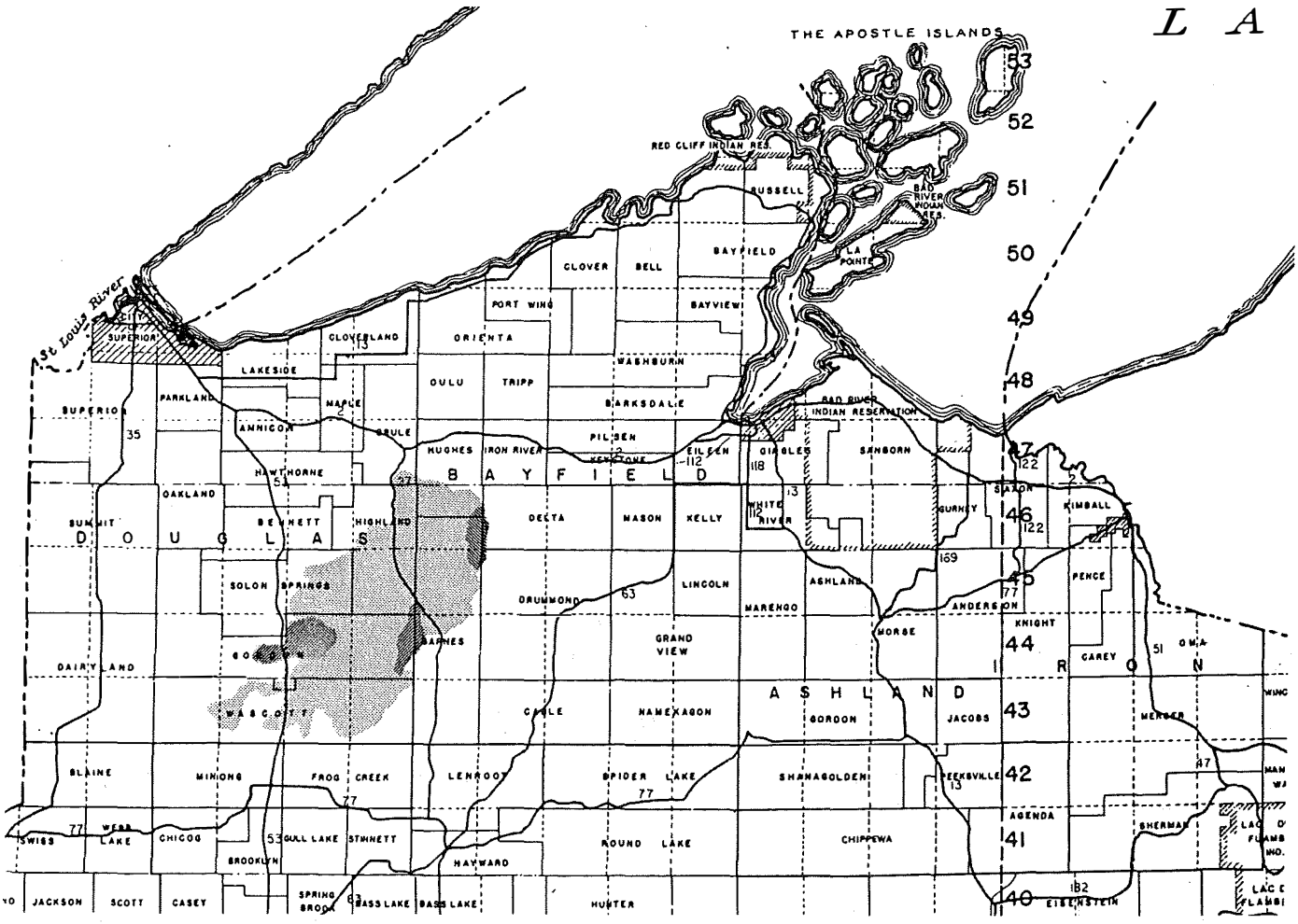


Figure 9. Area of light to moderate (light grey) and heavy (dark grey) defoliation of jack pine by the Jack Pine Budworm in Wisconsin, 1983.

Pine Tussock Moth - Dasychira pinicola (Dyar)

A drastic decline occurred in the infestation in Douglas and Bayfield Counties. No defoliation occurred and larvae were difficult to find. About 500 cords of previously defoliated and top-killed jack pine were killed by bark beetles this year.

Chainspotted Geometer Cingilia catenaria (Drury)

The area where heavy defoliation was reported in 1982 in Portage County, was resurveyed and no larvae were found in 1983.

Red Pine Needle Midge - Thecodiplosis piniresinosae (Kearby)

The outbreak that began with a single observation in Marquette County in 1977 has nearly disappeared. One 40-acre red pine plantation in Burnett County was lightly defoliated in 1983. Populations in Burnett and Washburn Counties declined severely in 1983.

Gouty Pitch Midge - Cecidomyia piniinopsis O.S.

Larvae were observed feeding on twigs and foliage of jack pine in Douglas County. The heaviest twig flagging occurred in Southern Douglas and Northwestern Washburn Counties.

A Needle Midge - probably Cecidomyia pinifoliae Felt

Yellowing of white pine foliage was observed in Grant, Vernon, Jackson and Clark Counties.

Phenological Notes:

May 9 - First egg hatch in Waukesha County.

European Pine Sawfly - Neodiprion sertifer (Geoffroy)

The general level of defoliation was greatly reduced in 1983 presumably due to the long period of cold wet weather in May and June. However, many reports were received of defoliation to forest and ornamental pines in Jefferson, Waukesha and Dane Counties.

The first operational use of the virus product Neochek-S in Wisconsin was conducted on Scotch pine Christmas trees in Grant County. No problems were encountered while mixing. Results: excellent.

Red Pine Sawfly - Neodiprion nanulus nanulus (Schedl)

Defoliation was considerably reduced in the south central counties. A heavy infestation in Marquette County continued but at reduced levels.

Phenological notes:

June 1 - Larva in 2nd and 3rd instars in Sauk, Columbia and Richland Counties.

Redheaded Pine Sawfly - Neodiprion lecontei (Fitch)

The infestation in the northeastern counties increased in area. New infestations were reported in Forest, Langlade, Marinette, and Portage Counties. Defoliation was generally light but pockets of heavy defoliation occurred in Forest County. Twenty acres in Langlade County were treated experimentally with the insecticide Pydrin and control was excellent.

Very few larvae were observed in a red pine plantation in Forest County that was sprayed in 1982 with both virus and malathion.

Phenological notes:

July 26 - Larvae in 2nd-4th instars in Forest County; 4th and 5th instars in Portage County.

Introduced Pine Sawfly - Diprion similis (Hartig)

Very light populations were observed in scattered locations. No significant defoliation was reported.

Phenological notes:

June 30 - First generation larvae dropping to ground in Iowa County.
July 27 - Adults emerging from cocoons in Burnett County.

Red Pine Shoot Moth - Dioryctria resinosella Mutuura

Numbers of attacked shoots increased from the 1982 low levels in the central counties. Light numbers of attacks on lateral shoots were observed in several central counties. A heavy population was observed in Waushara County.

Saratoga Spittlebug - Aphrophora saratogensis (Fitch)

Slight increase in numbers occurred. Of 800 acres of red pine plantations surveyed in Oneida and Menominee counties, 190 acres were treated with malathion. Pockets of flagging were found in a single red pine plantation in Columbia County.

Pine Spittlebug - Aphrophora parallela (Say)

Numbers increased significantly in Northwestern Wisconsin. Heavy populations of nymphs were observed on a jack pine in Polk, Burnett, Washburn, Douglas and Bayfield Counties.

Phenological notes:

May 18 - Nymphs appearing on jackpine in Douglas County.

Pine Bark Adelgid Pineus strobi (Hartig)

Populations remained relatively low. Infestations were reported on Scotch and white pine in Portage, Monroe, Waushara and Marquette Counties. Lady beetles and other predators were very active.

White Pine Aphid - Cinara strobi (Fitch)

Very heavy populations in Iowa and Walworth Counties caused scattered mortality in young white pine plantations.

Pine Root Collar Weevil - Hylobius radicis (Buchanan)

Damage in red and scotch pine remained approximately stable statewide. Scattered damage was observed in Washburn and Bayfield Counties.

White Pine Weevil - Pissodes strobi (Peck)

Numbers of attacked white and jack pine shoots increased in the central counties and decreased slightly in the northwestern counties. No attacks on red pine were reported. Severe injury was observed on white pine, jack pine and white spruce in Oneida County. Ten to twenty percent of white and jack pine terminals were attacked in some plantations in Jackson and Clark Counties.

Northern Pine Weevil - Pissodes approximatus (Hopkins)

Mortality by northern pine weevil in Lincoln County, was observed in red pine planted in 1983 on a site where jack pine had been clearcut in 1983. Mortality was scattered on 12 acres on the Lincoln County Forest.

Pine Bark Beetles - Ips sp.

Activity was generally low in the Northwest District except for areas where pine tussock moth was prevalent. Some scattered over mature jack pine was attacked by bark beetles and Armillaria root rot in Langlade County.

White Grubs - Phyllophaga sp.

Extremely high numbers of grubs were reported in Shawano County. A newly planted five acre red pine plantation in Columbia County suffered 90% mortality. A complete collapse of white grubs occurred in Douglas and Washburn Counties.

White Pine Needle Blight - Atmospheric gases

Necrosis of white pine needle tips which can be caused by atmospheric gases such as ozone or sulfur dioxide was common on white pine Christmas trees in Green, Marquette, Waushara, Washburn, and Waupaca Counties in July.

White Pine Needlecast - Unknown

A premature cast of 1982 needles was observed on white pine in June and July of 1983. Two locations were reported by DNR foresters. Grant County, Sec. 13, T8N, R2W, SWNW; and Vernon County, Sec. 13, T14N, R2W, NW¼, Wildcat Mountain State Park. The trees in the Grant County plantation range in age from five to ten years. The affected trees at Wildcat Mountain State Park are approximately 30 years old. Observations will be made in 1984 for more locations of this premature needlecast and fungal spore traps will be set out in the plantation in Grant Co.

BLACK WALNUT

Black Walnut Canker and Dieback

Research at the University of Wisconsin - Madison is continuing on determination of the cause of this verticle, elongate, canker. In 1983, cankered trees were observed in plantations in Richland and Vernon Counties.

Walnut Caterpillar - Datana integerrima (Grote)

The highest populations in many years defoliated black walnut and some hickory in the southern half of Wisconsin. Defoliation was generally more common in the western counties. Open grown trees from sapling size to mature trees were completely defoliated.

Pecan Leaf Casebearer - Acrobasis juglandis (LeBaron)

The numbers of overwintering larvae were extremely high in southern Wisconsin. Damage to expanding buds in young walnut plantations was generally heavy. The cold wet weather in May and June was apparently responsible for mortality of many larvae and their numbers were drastically reduced by late summer.

Phenological notes:

May 4 - Larvae beginning to mine buds.

A Shoot Borer - Acrobasis sp.

The numbers of this unnamed shoot borer were very high. A high proportion died in the shoots in mid June and by late June few could be found.

Larvae collected from black walnut shoots from Green and Iowa Counties and reared in the lab yielded adults of the unnamed Acrobasis and A. angusella Grote. The latter is known to bore in leaf stems of hickory.

A Leaf Beetle - Paria quadrinotata

Adult beetles feed on walnut buds in late April before buds begin growing. They usually feed on one side of a bud and gradually hollow it out. Feeding takes place in the evening and is seldom observed.

Large numbers of the beetles were observed in young walnut plantations in Richland County. Light damage was observed in Iowa County.

MISCELLANEOUS SPECIES

Whitemarked Tussock Moth - Orgyia leucostigma (J. E. Smith)

Populations increased over much of Southern Wisconsin; scattered reports of defoliation of ornamentals were received. Egg masses were commonly found during Gypsy Moth egg mass surveys in Stevens Point and Wisconsin Dells.

Gypsy Moth - Lymantria dispar (L.)

The total number of male moths caught in the cooperative trapping effort in Wisconsin was below that of 1982; however, moths were caught in more locations (Table 1). The numbers indicate potential for new infestations in Stevens Point, Lake Delton, Wisconsin Dells, Hubertus and Sheboygan. Egg surveys in seven locations turned up 10 egg masses in Hubertus. Treatments included mass trapping in Monona and Okauchee and sixty acres in Elm Grove sprayed twice with Bacillus thuringiensis plus mass trapping.

TABLE 1. MALE GYPSY MOTHS CAUGHT IN WISCONSIN BY COUNTIES-1983

Location	Number of Moths
Columbia County	
Wisconsin Dells*	7
Dane County	
Madison (city)	6
Madison (township)	2
Middleton	1
Monona	40
Grant County	
Boscobel	1
Kenosha County	
Pleasant Prairie Twnshp	1
Milwaukee County	
Greenfield	2
Milwaukee	3
Shorewood	2
Wauwatosa	1
Ozaukee County	
Mequon	2
Portage County	
Stevens Point*	4
Racine County	
Wind Point	1
Rock County	
Beloit	1
Magnolia Township	1
Janesville	
Sauk County	
Lake Delton*	4
Sheboygan County	
Sheboygan*	18
Walworth County	
Whitewater	2
Washington County	
Hubertus*@	39
Waukesha County	
Brookfield	1
Delafield Township	1
Elm Grove	5
Lannon	1
Oconomowoc Township*	17
Okauchee*	4
Winnebgo County	
Menasha	1
Neenah	1
Oshkosh	3
State Total	173

*Egg mass survey
@ 10 egg masses

Harold Line USDA-APHIS
10/7/83

Fall Webworm - Hyphantria cunea (Drury)

The highest populations in many years occurred in 1983. Webs were more numerous than normal over most southern counties and were extremely abundant along the Mississippi River as far north as Pepin County.

Saddled Prominent - Heterocampa guttiritta (Walker)

This late summer defoliater caused light defoliation of maple, oak and beech on Chambers Island in Door County.

Shoot Blight - Sphaeropsis ellisii Sacc.

One Colorado blue spruce plantation in Southern Langlade County showed branch mortality which is a continuation of disease development from severe infections in 1982.

Storm Damage - July 3, 1983

On July 3, 1983, a frontal system produced a long line of strong thunderstorms and downburst winds which created a path of damaged property and timber through Northwest Wisconsin. A map of the downburst based on an aerial survey by Brian Smith at the University of Chicago, is shown in Figure 10. The downburst path of damaged trees went through Polk, Burnett, Washburn, Sawyer, Douglas, and Bayfield Counties. The counties, timber types, and approximate acres affected are listed in Table 2.

Table 2. Approximate number of acres of various timber types damaged by downburst winds on July 3, 1983.

County	Timber Type	Acres
Douglas	Aspen	52,000
	Jack pine	600
	Jack pine - Red pine - White pine	4,500
Bayfield	Jack pine	20,000
	Northern hardwoods	22,000
Polk	Jack pine - Scrub oak	3,000
Burnett	Jackpine - Scrub oak	20,000
	Jackpine - Aspen - White Birch	2,500
Washburn	Jack pine - Aspen - Scrub oak	2,500
	Jackpine - White birch - Scrub oak	1,000
Sawyer	Northern hardwoods	10,000
	Total Acres	138,100

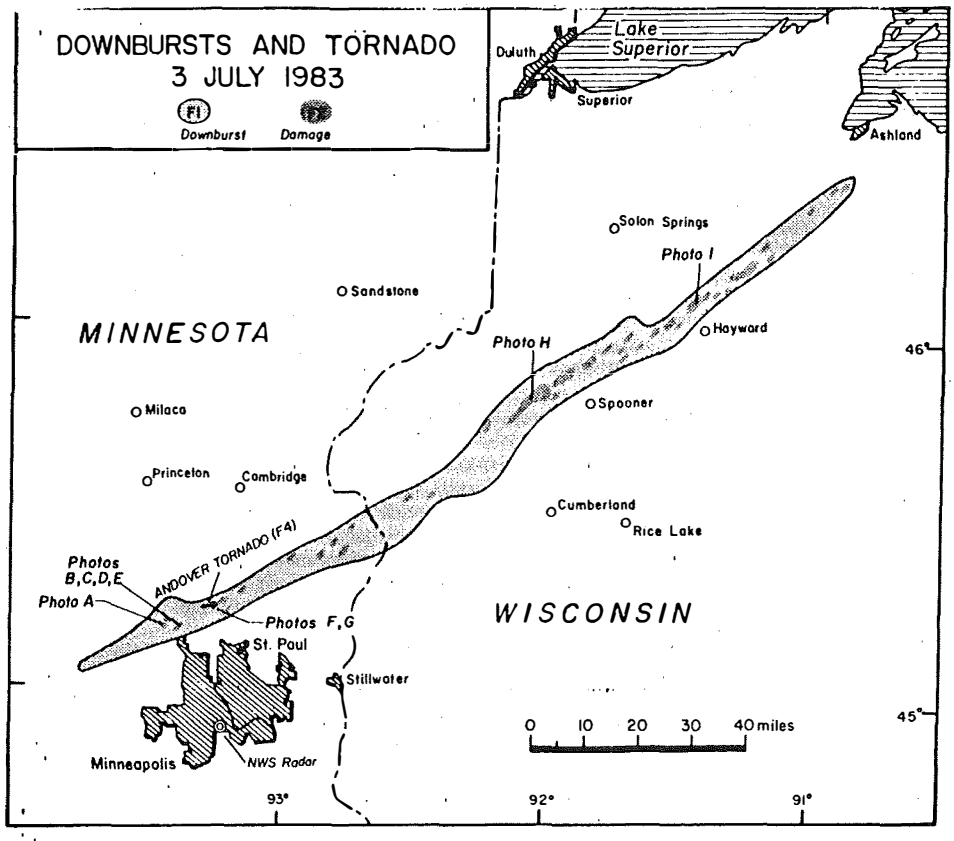


Figure 10. Path of downburst damage. Areas of 73-112 mph estimated winds are in light grey, and 113-157 mph winds are in dark grey. Map taken from Storm Data, Vol. 25, number 7, July 1983, Department of Commerce.

Diplodia Shoot Blight - Diplodia pinea (Desm.) Kickx.

A high incidence of infection occurred on red pine windbreaks at Wilson State Forest Tree Nursery near Boscobel. Widespread flagging of branches occurred on windbreak trees. In seedbeds infection of 1-0 seedlings was light and more severe on 2-0 seedlings. Seedlings preventatively treated with the fungicide benomyl were not infected. This treatment was part of an experiment designed by the USFS North Central Forest Experiment Station. No infection of seedlings occurred at Griffith Nursery, or Hayward State forest tree nursery.

CHRISTMAS TREE PROBLEMS

Scotch Pine Needlecast - Lophodermium pinastri (Schrad. ex. Hook.) Chev.

Lophodermium needlecast occurred in Christmas tree plantations and nurseries throughout Jackson, Langlade, Oneida, Portage, Shawano, Waupaca, Waushara, and Wood Counties. Scotch pine was the host most commonly affected. The Wisconsin DNR and Department of Agriculture cooperated to analyze foliage samples from 62 Christmas tree plantations in Waushara, Portage and Waupaca Counties. Forty-two of the 62 plantations were positive for the presence of Lophodermium. One Christmas tree grower aerially sprayed approximately 3,200 acres of Scotch pine four times (twice with chlorothalonil, once with maneb, and once with a chlorothalonil and maneb mixture) to control the disease.

Vaseline coated slides placed on wire stands in a Christmas tree plantation, were used to monitor spore dispersal. The number of Lophodermium spores on the slides were counted each week and peak spore dispersal occurred from September 28 through October 17. A cooperative study between the USFS North Central Forest Experiment Station and the WI DNR is being planned to study the epidemiology of this disease so that control sprays are timed most efficiently.

NURSERY PROBLEMS

A nursery disease control SWAT team comprised of scientists from the University of Wisconsin, USDA Forest Service, and Wisconsin Department of Natural Resources, continued to work on diseases and control of forest nursery trees in Wisconsin. Following, is a list of responsibilities of team members and research reports.

Nursery Disease Control Work Plan, Wisconsin - 1983

SWAT Team Action and Responsibilities*

John G. Berbee, Professor of Plant Pathology and Janet McFall, Graduate Student, Department of Plant Pathology, University of Wisconsin-Madison.

I. Continue to evaluate soil fumigation practices in state nurseries.

II. Develop disease control measures in the state nursery program.

Marge Palmer, Plant Pathologist, USFS, North Central For. Exp. Sta., St. Paul, MN.

III. Develop research approaches for investigating the cause of stunting in the nurseries.

IV. Continue to evaluate the effectiveness of benomyl as a control for Diplodia shoot blight on red pine seedlings.

*See Appendices for progress reports on some of these projects.

Jaya Iyer, Lecturer, Department of Soil Science, UW-Madison

V. Continue to analyze soil and tissue samples from the nurseries and advise on soil fertility and maintenance.

VI. Evaluate the quality of outplanted stock by assigning quality indexes.

VII. Determine a method of analyzing trace elements present in soil.

John Borkenhagen, Nursery Superintendent, Hayward State Nursery, and Jaya Iyer

VIII. Work at Hayward Nursery on leaf litter placement and its effects on young conifer seedlings.

Cathy Croghan, USFS, State and Private Forestry, St. Paul, MN, Plant Pathologist

IX. Continue a field evaluation of outplanted stunted conifers.

X. Evaluate the effectiveness of Bayleton in controlling Eastern gall rust in Minnesota nurseries.

XI. Continue to investigate the effectiveness of soil pasteurization on soil-borne plant pathogen control at Iowa State Nursery.

XII. Evaluate the walnut seed collection process in Minnesota and determine possible causes for a decrease in walnut seed germination.

Jane Cummings, Lab Technician, Department of Natural Resources, Pest Control, Madison, WI

XIII. Determine the incidence of stunting in the Wisconsin state nurseries.

XIV. Survey for the presence of larch needle cast in the Wisconsin state nurseries.

XV. Monitor white pine mortality at Wilson nursery.

James E. Kuntz, Professor of Plant Pathology, Vickie Radke, Specialist and Ned Tissuat, Postdoctoriate, Department of Plant Pathology, UW-Madison

XVI. Continue to study walnut seed rot and seedling mortality.

Allen Prey, Forest Pathologist, Department of Natural Resources, Forest Pest Control, Madison, WI and Dr. Berbee.

XVII. Determine the current status of control sprays for damping-off of conifer seedlings and investigate the possibility of registering an effective spray if necessary.

Appendix A

Effect and Timing of Benomyl Sprays in Controlling Diplodia Shoot Blight on Red Pine Seedlings.

Marguerita Palmer and Thomas Nicholls[1]

Benomyl reduced Diplodia infection in 1-0, and in 3-0 red pine at Wilson nursery even though sprays were not applied until after the most susceptible period for infection had passed. Sprays should begin in late April, as shown in the infection and spore dispersal studies but due to delays caused by weather and other factors, the first spray was not applied until May 20. A fungicide spray on 2-0 seedlings may not be necessary if good control is achieved from spraying 1-0 seedlings the previous year. It is important to control infection in 1-0 seedlings since this is where the majority of losses occur. Diplodia infection on 1-0 seedlings can be reduced by 2 benomyl sprays applied in August, although 4 or 6 sprays applied July - August or June - August provide better control. Similar results were found in 1981.

The major sources of Diplodia inoculum in nurseries are infected red pine seedlings and cones. Cones on trees pose more of a threat than those on the ground.

Diplodia infection can be reduced in nurseries from a combination of management techniques: a fungicide program as described above, rogueing infected seedlings, and eliminating or reducing important sources of Diplodia inoculum.

Appendix B

Mortality of 2-0 White Pine at Wilson State Forest Tree Nursery

Jane E. Cummings[2]

Approximately .9 acre (1.5 nursery sections) of 2-0 white pine showed symptoms of top wilting, chlorosis, and necrosis in 1983. Inventory of these seedlings in one .6 acre section showed that 19% of the total number of seedlings were dead by June 20, 1983. Average mortality in the two outside or border rows of the section was 33% compared to 4.2% mortality in the inner rows. The higher mortality in the outer rows may be a result of faster reinfestation by plant pathogens of soil adjacent to nonfumigated soil under the pipe lines than soil farther from the pipe lines.

Ninety water gauges were placed in the .6 acre section where the white pine mortality was most severe to help determine the effectiveness of water distribution from the irrigators. The gauges were left for one week (August 2-9) and collected water from the irrigators (approximately 7 hours of watering time). There was no measurable rain during the test time. Table 1 lists the average cm of water in each row.

[1]Associate and Principal Plant Pathologists, North Central Forest Pest Experiment Station, USDA Forest Service, St. Paul, MN

[2]Forest Pathologist, Department of Natural Resources, Forest Pest Control, Madison, WI

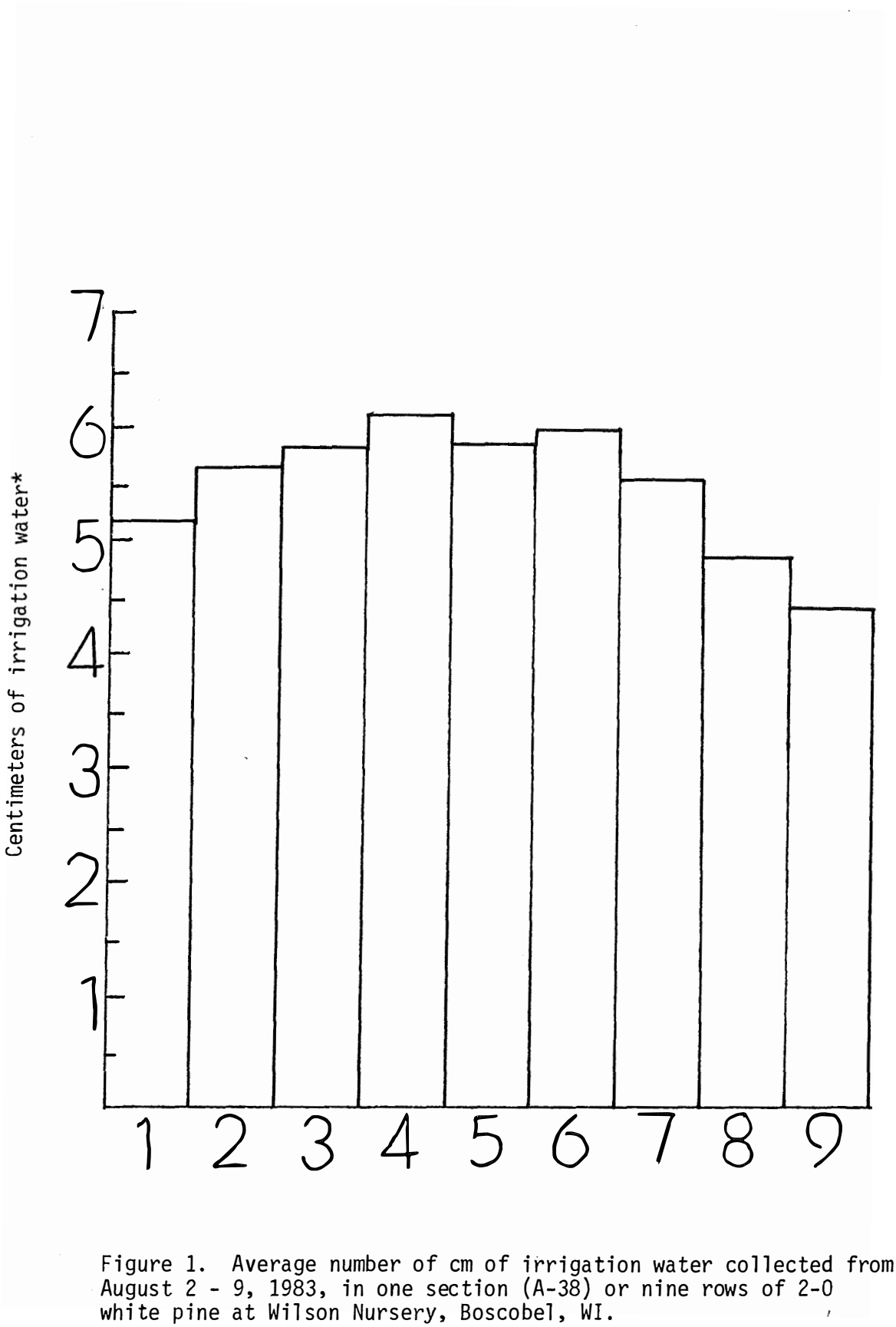


Figure 1. Average number of cm of irrigation water collected from August 2 - 9, 1983, in one section (A-38) or nine rows of 2-0 white pine at Wilson Nursery, Boscobel, WI.

*Numbers are the average of ten water gauges per row.

Three outer rows (#1, 8 & 9), received statistically significant (at the .1 level) lower levels of water than the inner rows (#4, 5 & 6). These differences in watering may play a part in the initial higher incidence of white pine mortality in the outer rows than the inner rows. This factor will be considered in further study of white pine mortality.

Appendix C

Stunting of Tree Seedlings in Wisconsin's Forest Tree Nurseries

Jane E. Cummings[1]

Some forest tree seedlings at Hayward, Griffith, and Wilson State Nurseries have shown a pattern of cessation or reduction in growth during mid-summer. These seedlings do not noticeably put on height or diameter growth past mid summer and are "stunted" at the end of the first growing season when compared to seedlings that have grown throughout the summer. This phenomenon has been observed in spruce, pine, cedar, larch, hard maple, oak, and occasionally in other genera. Studies on soil nutrition, soil and plant pathogens, and mycorrhizae have been done but no conclusive evidence for a cause of stunting in the Wisconsin State nurseries has been reached. As part of the responsibilities of the Wisconsin nursery disease control team to determine the impact and cause of stunting, the WI DNR set up a survey at Griffith Nursery to monitor and compare the growth of stunted and nonstunted red and white pine and sugar maple. Fifty stunted and 50 nonstunted trees of each species were measured for height and tagged. These trees will be remeasured in 1984 and monitored for survival. Researchers at the University of Wisconsin - Madison, and USFS North Central Forest Experiment Station are currently investigating the cause of stunting.

Appendix D

EVALUATION OF A PROTECTIVE FUNGICIDE SPRAY PROGRAM FOR CONTROL OF JACK PINE GALL RUST

Catherine F. Croghan[2]

The General Andrews State Nursery at Willow River, Minnesota recently experienced severe jack pine gall rust infection. Minnesota Department of Natural Resource personnel reported 70 percent cull due to obvious galls in the 1982 fall lifted 2-0 stock. As a result of these, and previous years' losses, Forest Pest Management (FPM) was asked to work with Minnesota Forest Pest Specialists and nursery personnel to develop a protective fungicide program to be part of an overall gall rust control program. In June, 1983, Wisconsin Department of Natural Resource personnel reported losses to this disease and asked that the fungicide evaluation be expanded to include the Hayward State Nursery.

[1]Forest Pathologist, Department of Natural Resources, Forest Pest Control, Madison, WI

[2]Plant Pathologist USDA Forest Service, Forest Management, Northeastern Area State and Private Forestry, St. Paul, MN

Galls typical of both pine-pine Endocronartium harknessii (J. P. Moore) (Y. Hiratsuka) and pine-oak gall rusts Cronartium quercuum (Berk.) Miy. ex Shirai) were observed on stock. As both diseases occur in the vicinity of the nurseries, it is possible that losses resulted from infections of one or both fungi.

Fusiform gall rust Cronartium quercuum (Berk.) Miy. ex Shirai F. sp. fusiforme (Burdsall and Snow) in southern pine nurseries has been successfully controlled with applications of the systemic fungicide, triadimefon (Bayleton) (Rowan 1982). Because fusiform and pine-oak gall rusts are caused by the same species (Burdsall and Snow 1977), it is probable that triadimefon will control the latter. Although pine-pine gall rust is caused by a distinctly different fungus, it too has been reported to be controlled with triadimefon applications in Christmas tree plantations (Anon. 1982, McCain personal communication 1983).

A three year evaluation of a Bayleton 50WP application program for control of jack pine gall rust began in 1983 at the General Andrews and Hayward State Nurseries.

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Burdsall, H. and G. Snow. 1977. Taxonomy of Cronartium quercuum and C. fusiforme. Mycologia 69:503-508.

Rowan, S. 1982. Influence of method and rate of application of Bayleton on fusiform rust on slash pine. Tree Planters Notes 33 (1):15-17.

1983 ACTIVITIES ON THE GALL RUST EVALUATION PROJECT

Catherine F. Croghan[1]

GALL RUST IDENTIFICATION

In order to get immediate information on the species of gall rust present at the Nursery, sporulating galls were collected from the windbreaks by Minnesota Department of Natural Resources, Forest Pest Specialist (FPS) and USDA Forest Service, Forest Pest Management (FPM) personnel. The results of aeciospore germination tube elongation tests run by FPM showed all specimens (n=10) to be pine-oak galls (Cronartium quercuum). FPS results found 80 percent of the galls they sampled were pine-oak while the remainder were pine-pine (Endocronartium harknessii) (n=5). Pooling these results (n=15), we found the majority of the windrow galls were pine-oak, 93 percent.

Because jack pine galls do not sporulate until two years after infection, it was not possible to positively identify the galls that formed on 2-0 stock prior to lifting. Therefore, Nursery personnel transplanted 250 galled 2-0 identified to species by germination tube tests.

CHEMICAL CONTROL

Nursery personnel at the General Andrews Nursery, Willow River, made five Bayleton 50WP applications (4 oz /A) beginning on June 1 and continuing at approximately two week intervals thru July.

EXPANSION OF EVALUATION TO HAYWARD NURSERY

In June, FPM was asked by the Wisconsin Department of Natural Resources to expand this evaluation to Hayward State Nursery, Hayward, Wisconsin. Plots were established in 1-0 jack pine beds on June 21. Bayleton 50WP applications (4 oz /A) began on June 23 and continued at two week intervals until August 4.

[1] Plant Pathologist USDA Forest Service, Forest Pest Management, Northeastern Area State and Private Forestry, St. Paul, MN